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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/479,146	01/07/2000	STEPHEN FULD	99-051-TAP	2688

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EXAMINER

MASKULINSKI, MICHAEL C

ART UNIT	PAPER NUMBER
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2184

DATE MAILED: 08/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/479,146

Applicant(s)

FULD, STEPHEN

Examiner

Michael C Maskulinski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 January 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 January 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-8, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Stolowitz, U.S. Patent 6,018,778.

Referring to claims 1, 5:

- a. In the Abstract, Stolowitz discloses a disk drive array with parity data based upon data blocks and a disk drive array controller that carries out disk drive data transfers.
- b. In column 6, lines 20-22, Stolowitz discloses methods and circuitry for effecting synchronous data transfer to and from an array of disk drives (reading blocks sequentially from respective data storage elements).

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c. In column 8, lines 42-44, Stolowitz discloses reconstructing missing data in the event of any single drive failure (determining if any of the data blocks are bad as the data blocks are being read).

d. In column 8, lines 42-48, Stolowitz discloses that to reconstruct missing data in the event of any single drive failure, the serialized read data stream is passed through an N+1 stage pipeline register. To begin, a word from the first drive is loaded into an accumulator and into the pipeline. As the next data word enters the pipeline from the next drive, it is XORed with the first word and the result stored in an accumulator.

e. In column 8, lines 48-55, Stolowitz discloses that the accumulating process is repeated for each subsequent drive except that data from the failed drive is ignored. Once the data from the last (redundant) drive enters the pipeline (reading the parity block from the parity storage element), the accumulator will be holding the data from the missing drive. This result is transferred to a hold latch, and when the missing word in the pipeline from the failed drive is reached, the contents of the hold latch is substituted in place of the pipeline contents (reconstructing a bad data block from the accumulated parity of the good data blocks and the parity block).

Referring to claims 2, 6, in column 8, lines 42-48, Stolowitz discloses that to reconstruct missing data in the event of any single drive failure, the serialized read data stream is passed through an N+1 stage pipeline register. To begin, a word from the first drive is loaded into an accumulator and into the pipeline. As the next data word enters

the pipeline from the next drive, it is XORed with the first word and the result stored in an accumulator (accumulating parity of the good data blocks includes exclusive ORing the parity of the good data blocks read prior to the current good data block being read with the current good data block being read).

Referring to claims 3, 7, in column 8, lines 48-55, Stolowitz discloses that the accumulating process is repeated for each subsequent drive except that data from the failed drive is ignored. Once the data from the last (redundant) drive enters the pipeline, the accumulator will be holding the data from the missing drive. This result is transferred to a hold latch, and when the missing word in the pipeline from the failed drive is reached, the contents of the hold latch is substituted in place of the pipeline contents (reconstructing a bad data block includes exclusive ORing the accumulated parity of the good data blocks and the parity block).

Referring to claim 4, in column 8, lines 48-55, Stolowitz discloses that the accumulating process is repeated for each subsequent drive except that data from the failed drive is ignored. Once the data from the last (redundant) drive enters the pipeline, the accumulator will be holding the data from the missing drive. This result is transferred to a hold latch, and when the missing word in the pipeline from the failed drive is reached, the contents of the hold latch is substituted in place of the pipeline contents (storing the good data blocks read after the bad data block until the bad data block is reconstructed to preserve ordering of the data blocks during reading).

Referring to claim 8, in column 8, lines 42-44, Stolowitz discloses an $N+1$ stage pipeline register (a buffer for storing the good data blocks read by the controller after the

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bad data block until the controller reconstructs the bad data block to preserve ordering of the data blocks during reading).

Referring to claim 10, in the Abstract, Stolowitz discloses a disk drive array (magnetic disk drives).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 9, 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stolowitz, U.S. Patent 6,018,778.

Referring to the limitation "the storage elements are magnetic tape drives or a track of a magnetic tape" of claims 9, 11, 12, and 16, in the Abstract, Stolowitz discloses a disk drive array. However, Stolowitz doesn't explicitly disclose a magnetic tape drive. The Examiner takes Official Notice that it is well known in the art of redundant storage systems to use different types of storage. It would have been obvious to one of ordinary skill at the time of the invention to include an alternative storage device into the redundant storage system of Stolowitz. A person of ordinary skill in the art would have been motivated to make the modification because a magnetic tape drive is a well-known storage device in storage systems. Further, the system of Stolowitz is compatible with a tape disk drive because it contains a SCSI bus which is a common interface for devices such as CD-ROM drives and backup tape drives as well as hard disks (see column 4,

lines 15-17). Also, in column 8, lines 32-33, Stolowitz discloses the use of a serial stream when reading from the disk drives which is necessary for a tape drive.

Referring to the remaining limitations in claims 12 and 16:

- a. In the Abstract, Stolowitz discloses a disk drive array with parity data based upon data blocks and a disk drive array controller that carries out disk drive data transfers.
- b. In column 6, lines 20-22, Stolowitz discloses methods and circuitry for effecting synchronous data transfer to and from an array of disk drives (reading blocks sequentially from respective data storage elements).
- c. In column 8, lines 42-44, Stolowitz discloses reconstructing missing data in the event of any single drive failure (determining if any of the data blocks are bad as the data blocks are being read).
- d. In column 8, lines 42-48, Stolowitz discloses that to reconstruct missing data in the event of any single drive failure, the serialized read data stream is passed through an N+1 stage pipeline register. To begin, a word from the first drive is loaded into an accumulator and into the pipeline. As the next data word enters the pipeline from the next drive, it is XORed with the first word and the result stored in an accumulator.
- e. In column 8, lines 48-55, Stolowitz discloses that the accumulating process is repeated for each subsequent drive except that data from the failed drive is ignored. Once the data from the last (redundant) drive enters the pipeline (reading the parity block from the parity storage element), the accumulator will be

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holding the data from the missing drive. This result is transferred to a hold latch, and when the missing word in the pipeline from the failed drive is reached, the contents of the hold latch is substituted in place of the pipeline contents (reconstructing a bad data block from the accumulated parity of the good data blocks and the parity block).

Referring to claim 13, in column 8, lines 42-48, Stolowitz discloses that to reconstruct missing data in the event of any single drive failure, the serialized read data stream is passed through an N+1 stage pipeline register. To begin, a word from the first drive is loaded into an accumulator and into the pipeline. As the next data word enters the pipeline from the next drive, it is XORed with the first word and the result stored in an accumulator (accumulating parity of the good data blocks includes exclusive ORing the parity of the good data blocks read prior to the current good data block being read with the current good data block being read).

Referring to claim 14, in column 8, lines 48-55, Stolowitz discloses that the accumulating process is repeated for each subsequent drive except that data from the failed drive is ignored. Once the data from the last (redundant) drive enters the pipeline, the accumulator will be holding the data from the missing drive. This result is transferred to a hold latch, and when the missing word in the pipeline from the failed drive is reached, the contents of the hold latch is substituted in place of the pipeline contents (reconstructing a bad data block includes exclusive ORing the accumulated parity of the good data blocks and the parity block).

Referring to claim 15, in column 8, lines 48-55, Stolowitz discloses that the accumulating process is repeated for each subsequent drive except that data from the failed drive is ignored. Once the data from the last (redundant) drive enters the pipeline, the accumulator will be holding the data from the missing drive. This result is transferred to a hold latch, and when the missing word in the pipeline from the failed drive is reached, the contents of the hold latch is substituted in place of the pipeline contents (storing the good data blocks read after the bad data block until the bad data block is reconstructed to preserve ordering of the data blocks during reading).

Referring to claim 17, in column 8, lines 42-44, Stolowitz discloses an N+1 stage pipeline register (a buffer for storing the good data blocks read by the controller after the bad data block until the controller reconstructs the bad data block to preserve ordering of the data blocks during reading).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,237,052 B1	Stolowitz
U.S. Patent 6,055,646	Uchihori et al.
U.S. Patent 6,023,780	Iwatani
U.S. Patent 5,758,057	Baba et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C Maskulinski whose telephone number is (703)

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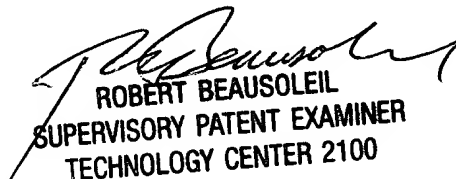
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308-6674. The examiner can normally be reached on Mon-Thu 7:30-5 and Fri. 7:30-4 (second Fri.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoleil can be reached on (703) 305-9713. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

MM
August 20, 2002


ROBERT BEAUSOLEIL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100